MULTIYEAR COST MODELING

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FINAL

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by

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The pronouns "he," nis," and "him;" when used in this publication represent both the masculine and feminine genders unless otherwise specifically stated.

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EXECUTIVE SUMMARY

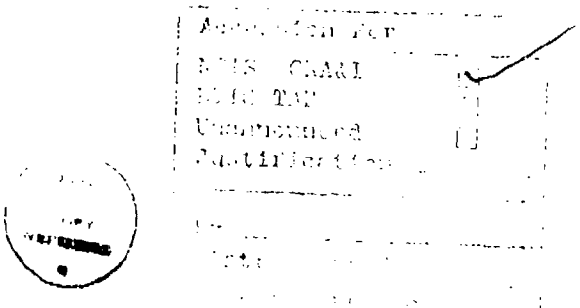
A. BACKGROUND. One of the primary challenges to those wishing to employ multiyear procurement (MYP) is to convince the skeptics of the cost savings due to this contracting technique. The demonstration of cost savings is a statutory and regulatory criterion for MYP application, and failure to demonstrate significant savings can be an effective barrier to the employment of this strategy. At present, there is no comprehensive cost projection model available to estimate savings due to MYP.

B. STUDY OBJECTIVES. The objective of this study is to synthesize old and new techniques or factors of cost estimating into a comprehensive multiyear cost model.

C. RESEARCH DESIGN. Research consisted of (i) a review of pertinent literature; (ii) analysis of MYP cost projection techniques being used within Army Materiel Command (AMC); (iii) visits to selected Major Subordinate Commands, Project Management Offices within the AMC and contractors with recent experience in multiyear contracting; and (iv) development of a methodology to estimate MYP savings.

D. FINDINGS AND CONCLUSIONS. Two techniques, learning curve and factor estimation, are being used to estimate MYP savings. Factor estimation is the only viable technique. Five savings factors are identified. Of these, inflation avoidance is not a viable factor, and capital investment and administrative savings provide only slight promise. Vendor procurement and manufacturing are the likely sources of savings, but only when advanced purchase is authorized. Efficient scheduling, greater competition, effect on business base, economic environment, make or buy decisions and economic order quantity are the primary contributors to savings from manufacturing and vendor procurement. Qualitative guidance is provided, but a reliable and verifiable quantification of the variables is not feasible at the present time.

E. RECOMMENDATION. It is recommended that the factor estimation technique be used to estimate MYP cost savings and emphasis be placed on the savings from manufacturing and vendor procurement.



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CHAPTER I

INTRODUCTION

A. BACKGROUND/PROBLEM.

With the passage of Public Law 97-86 in December 1981, many restrictions on the use of the multiyear procurement (MYP) method were removed. This move was hailed in most quarters of the defense community, and great things were expected from broader application of multiyear contracting strategy, as it was one of the thirty-two Carlucci initiatives outlined by the then Deputy SECDEF in April, 1981. However, by 1983 progress in implementing the revised statute was so limited that the Deputy SECDEF was moved to select multiyear procurement as one of six Defense Acquisition Improvement Program (DAIP) initiatives to receive special emphasis in the future.

One of the primary challenges to those wishing to employ multiyear procurement is to convince the skeptics of the cost savings attendant to this contracting technique. As demonstration of cost reductions is a statutory and regulatory criterion for multiyear application, failure to demonstrate significant savings can be an effective barrier to the employment of this contracting strategy.

At present, there is no comprehensive Army cost projection and risk assessment model for multiyear candidates. Consequently, various cost projection techniques are in use which may or may not capture the full savings potential of multiyear candidates. The need for such a model was first identified by this office during the course of research on APRO 81-10, Adapting to Multiyear Procurement. [16] Since that time, a continuing need has surfaced during consultations with procurement and project

management personnel. That such a need still exists is evidenced by the DAIP status report which notes that:

> "Validation of contract savings leading to the decision to contract on a multiyear basis has received attention in recent Congressional hearings and GAO studies. Various methods of representing savings from multiyear contracting have led GAO to state that levels of savings originally stated by the services in justifying a multiyear contracting strategy have not materialized ...while GAO reaffirmed that no minimum savings should be established, confusion over the savings realized in this area distorts the value of this technique in producing significant benefits to the Government in addition to cost savings." [23]

Army Materiel Command (AMC) activities have had several years experience in multiyear cost projections. It is time to draw on this experience and, if feasible, develop a comprehensive model for estimating cost savings due to MYP.

B. OBJECTIVE.

The specific study objective is to synthesize old and new techniques or factors of cost estimating into a comprehensive multiyear cost model.

C. SCOPE.

The research effort is limited to the multiyear savings projection due to the major weapon systems and related hardware in a sole source environment. (Major weapon systems are usually in a sole source environment by the time they are considered for MYP.)

D. APPROACH.

1. The approach to accomplish the above objectives was as follows:

a. Review pertinent literature.

b. Analyze multiyear cost projection techniques being used within AMC for major weapon systems.

c. Visit selected Major Subordinate Commands (MSC) and Project Management Offices (PMO) within AMC and contractors with recent experience in multiyear contracts.

d. Develop a methodology for estimation of multiyear cost savings.

2. The MSC's and PMO's visited to gain an understanding of the methodology used to estimate the projected savings due to Multiyear contracting were:

a. US Army Aviation System Command (AVSCOM)

1. CH-47 Modernization

2. Blackhawk

b. US Army Missile Command (MICOM)

1. Multiple Launch Rocket System (MLRS)

2. Tube-Launched, Optically Tracked, Wire-guided Missile (TOW)

3. The defense contractors visited were:

a. Grumman Aerospace Corporation
Long Island
New York, NY

b. United Technologies
Sikorsky Aircraft
Stratford, Connecticut

c. General Electric
Lynn, Massachusetts

d. Martin Marietta Aerospace
Orlando, Florida

4. Telephonic contacts were made with the US Army Tank - Automotive Command (TACOM) for the following two programs:

a. Bradley Fighting Vehicle turret drive

b. Bushmaster 25 mm guns

E. REPORT ORGANIZATION.

Chapter II discusses the historical developments in multiyear procurement. The possible factors which can contribute to cost savings due to MYP are discussed in Chapter III, and Chapter IV presents the difficulties inherent in estimating MYP cost savings. Chapter V states the study findings and conclusions.

CHAPTER II

HISTORICAL PERSPECTIVE

A. INTRODUCTION.

The successful application of MYP strategy requires the understanding of constraints imposed by "statute" and of the methodology used to satisfy the requirements, especially the requirement for the cost saving. In this chapter the present status of constraints (applicable rules) for MYP, the techniques used to estimate cost savings and the risk analysis are addressed briefly.

B. MULTIYEAR PROCUREMENT.

1. History.

The basic assumption behind MYP is that if the commitment to purchase goods for several years is made with the same supplier, the supplier can reduce his costs by employing a variety of techniques such as advance procurement of material, plant modernization and efficient production scheduling. It is also hoped that the reduced costs to the contractor will result in reduced costs for the government. As early as 1962, a form of MYP was adapted by the Office of the Secretary of Defense to procure requirements for a particular item or service that was needed on a repetitive basis. MYP as implemented then simply amounted to a series of single-year contracts to one particular contractor if Congress appropriated funds. Each "Program Year" of MYP had to be authorized separately. The main problems associated with MYP on a single year basis were stated as follows:

"a. Annual administration costs to Government and industry

associated with annual proposal preparation, evaluation and negotiations.

b. Difficulty in obtaining adequate competition for an item or service that requires high initial start-up (i.e., nonrecurring) costs due to the fact that a previously successful producer (who has already amortized some of those costs) could easily be in a cost position that would provide a distinct competitive advantage.

c. Instability of contractor work force which led to higher cost due to personnel turnover and loss of learning curve advantages." [16]

The primary benefit from this arrangement was that nonrecurring costs (NRC) were amortized over all units to be delivered during the entire multiyear contract period. If the future years were not funded, the contract was cancelled and the government assumed a legal liability to reimburse the contractor for the portion of NRC that had been allocated for future years' production. This practice placed unlimited legal liability on the Government in case of a cancelled contract. In fact in 1972 the Navy presented Congress with cancellation charges exceeding $109 million which had arisen out of cancelled MYP shipbuilding contracts.[6] In order to limit future liability due to the cancellation of MYP, the Congress, as part of the FY 73 Defense Authorization Act, instituted a $1 million cancellation ceiling limit. Three years later this ceiling was raised to $5 million. At this point in time the MYP was limited by:

a. the type of contract (i.e., firm fixed price or fixed price with economic price adjustment),

b. level pricing (i.e., unit pricing of each item must be the same),

c. cancellation ceiling ($5 million); and

d. full funding (DOD Directive 7200.4) in advance to cover the total estimated cost.

2. Recent Initiative(s).

The restrictions stated above imposed by the policies and regulations barred the Government from effectively using MYP to procure complex and expensive items. It was the consensus of Government and industry that these restrictions were impeding the full exploitation of MYP concept to derive the most cost savings.[16, 18] Section 909 of the Department of Defense Authorization Act of 1982 (Public Law 97-86), which was signed into law on 1 December 1981, removed most of obstacles mentioned above.[7]

Specifically, PL 97-86 authorizes the following changes:

a. Raises the cancellation ceiling to $100 million;

b. Requires the notification to Congress 30 days in advance of entering into a multi-year contract with a cancellation ceiling in excess of $100 million; (The House Appropriation Committee Report 97-943, 1983, tightens this notification requirement to a $20 million cancellation ceiling).

c. Allows inclusion of recurring and non-recurring costs in the cancellation provisions;

d. Allows the use of any kind of contract, except cost-plus-a-percentage-of-cost;

e. Provides a clear authorization for the advance procurement of components, parts and materials in order to achieve economic quantity lot purchases and more efficient production rates;

f. Provides a maximum term of five program years for multiyear

contracts;

g. Identifies possible cancellation funding sources as:

(1) appropriations originally available for the performance of the contract concerned;

(2) appropriations currently available for procurement of the type of property concerned, and not otherwise obligated; or

(3) funds appropriated for those payments.

Public Law 97-86 provides the following criteria to select weapon systems and services associated with weapon systems for MYP. It states that the head of an agency may approve multiyear contracts whenever he finds:

(a) that the use of such a contract will promote the national security of the United States and will result in reduced total costs under the contract;

(b) that the minimum need for the property to be purchased is expected to remain substantially unchanged during the contemplated contract period in terms of production rate, procurement rate, and total quantities;

(c) that there is a reasonable expectation that throughout the contemplated contract period the Department of Defense will request funding for the contract at the level required to avoid contract cancellation;

(d) that there is a stable design for the property to be acquired and that the technical risks associated with such property are not excessive; and

(e) that the estimates of both the cost of the contract and the anticipated cost avoidance through the use of a multiyear contract are realistic.

C. MYP COST SAVINGS.

Commonly used cost estimating techniques - industrial engineering, analogy, and parametric - do not include consideration of production efficiency, volume discount, more competition at the subcontractor level or

productivity improvement initiatives. Since such factors are important to MYP, these techniques cannot be used to estimate MYP savings. Two other techniques, learning curve and factor estimation, are being used to estimate MYP savings. These techniques are discussed below.

1. Learning Curve.

The basic principle behind learning curve theory is that "as the number of units of production doubles, the cost per unit decreases at a constant rate" when the production process proceeds without break. The reduction is achieved through labor and management learning.

Under this technique, savings due to MYP are attributed to the continuation of the production process without breaks. Quantitative structure for estimating MYP savings can be developed by considering the following hypothetical situation. MYP provides the continuation of the production process, whereas each annual contract involves the setting up of production facilities in the beginning and tearing them down at the end of the contract year. In the annual year environment, the unit one cost can be considered as the cost of the first unit during each annual contract. However, in reality each new year production will start from a prenegotiated price which will be less than the first unit cost.[3]

The general formulation for a learning curve using individual unit curve theory is

$$y = c\ x^b \qquad (1)$$

where

y = cost of the xth unit,

x = cumulative unit numbers,

b = slope of learning curve,

c = first unit cost. [17]

Assuming there is a need for Q items and (Q/K) items are to be procured each year, for K years, then the total MYP cost will be given by

$$c \int_{.5}^{Q+.5} x^b \, dx = \frac{c}{b+1} \left\{ (Q + .5)^{b+1} - .5^{b+1} \right\} \qquad (2)$$

Total cost due to K annual year contracts will be given by

$$K \left[c \int_{.5}^{\frac{Q}{K}+.5} x^b \, dx \right] = \frac{Kc}{b+1} \left\{ \left(\frac{Q}{K} + .5 \right)^{b+1} - (.5)^{b+1} \right\} \qquad (3)$$

Using equations (2) and (3), the percent savings due to MYP are given by

$$\frac{K \left\{ \left(\frac{Q}{K} + .5 \right)^{b+1} - (.5)^{b+1} \right\} - \left\{ (Q + .5)^{b+1} - (.5)^{b+1} \right\}}{K \left\{ \left(\frac{Q}{K} + .5 \right)^{b+1} - .5^{b+1} \right\}} \qquad (4)$$

When the number of units procured is different each year then the equation (4) will take the form

$$\sum_{i=1}^{N} \left\{ (Q(i) + .5)^{b+1} - .5^{b+1} \right\} - \left\{ \left(\sum_{i=1}^{N} Q(i) \right) + .5 \right\}^{b+1} + .5^{b+1}$$

(5)

$$\sum_{i=1}^{N} \left\{ \left[(Q\ (i) + .5)^{b+1} - .5^{b+1} \right] \right\}$$

where

Q (i) = number of units procured during ith year,

N = number of years.

It is clear from equation (4) that percent savings depend upon quantity procured, (Q), number of years in MYP, (K), and the learning curve slope, (b). It is felt that this formulation is superior than Booz-Allen & Hamilton findings which state tnat

> "the percent savings do not depend on the total quantity procured, but only on the number of years in the MYP, (k), and the learning curve coefficient, (b)." [3]

By using equation (4), numerical estimates for MYP cost savings for 60, 120 and 180 quantities, when the length of MYP varies from 1 to 5 years, are calculated. These estimated savings for the .99, .95 and .90 learning curve slopes are shown in tables 1, 2 and 3 respectively. For example, when learning curve slope changes from .99 to .90, the percent savings increase from 2.12 to 19.9, 2.19 to 20.5 and 2.23 to 20.8 for 60, 120 and 180 quantities respectively for a five year contract. These tables clearly show that quantity, number of years in MYP and the learning curve slope impact MYP cost savings. The most pronounced effect is due to the learning curve slope. Cost savings are dependent not only on total quantity procured during MYP but also on the quantity procured during each year. This effect is shown by using equation (5) in tables 4 and 5 for a

TABLE 1. PERCENT SAVINGS DUE TO MYP

(LC Slope = .99)

Quantity "Q"	k=1	k=2	k=3	k=4	k=5
60	0	.94	1.47	1.84	2.12
120	0	.96	1.52	1.90	2.19
180	0	.97	1.53	1.92	2.23

TABLE 2. PERCENT SAVINGS DUE TO MYP

(LC Slope = .95)

Quantity "Q"	k=1	k=2	k=3	k=4	k=5
60	0	4.7	7.2	8.3	10.3
120	0	4.8	7.4	9.0	10.6
180	0	4.9	7.5	9.4	10.8

TABLE 3. PERCENT SAVINGS DUE TO MYP

(LC Slope = .90)

Quantity "Q"	k=1	k=2	k=3	k=4	k=5
60	0	9.3	14.3	17.5	19.9
120	0	9.6	14.7	18.1	20.5
180	0	9.7	14.8	18.3	20.8

TABLE 4. PERCENT SAVINGS IN EACH MYP YEAR

(LC Slope = .99)

Quantity = 60

Quantity Yr-1/Yr-2/.../Yr-5	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5
30/30	0	1.89	--	--	--
20/40	0	1.30	--	--	--
20/20/20	0	1.85	2.58	--	--
10/20/30	0	1.25	1.89	--	--
15/15/15/15	0	1.81	2.54	3.02	--
10/15/15/20	0	1.45	2.34	2.58	--
12/12/12/12/12	0	1.78	2.51	2.98	3.33
10/8/12/10/20	0	1.93	2.19	2.95	2.58

TABLE 5. PERCENT SAVINGS IN EACH MYP YEAR

(LC Slope = .95)

Total Quantity = 60

Quantity Yr-1/Yr-2/.../Yr-5	Yr-1	Yr-2	Yr-3	Yr-4	Yr-5
30/30	0	9.4			
20/40	0	6.6			
20/20/40	0	9.2	12.6		
10/20/30	0	6.34	9.4		
15/15/15/15	0	9.1	12.4	14.6	
10/15/15/20	0	7.3	11.5	12.6	
12/12/12/12/12	0	8.8	12.3	14.4	16.0
10/8/12/10/20	0	9.5	10.8	14.3	12.6

hypothetical case of sixty items and .99, .95 learning curve slopes.

The learning curve captures the benefits due to production continuity. For noncompetitive major weapon systems, process continuity can usually be maintained through annual contracts by proper administrative actions. Thus savings estimates obtained by using the learning curve cannot be construed as solely due to MYP.

2. Factor Estimation.

This technique estimates the cost reduction due to program stability, improved competition at the subcontractor level, planned capital equipment investment and application of quantity discounts. It is believed that each of these factors contributes to cost savings, but no technique has been found in the literature to calculate the contributions due to each factor.

A determination and finding (D&F) is required to justify the use of MYP strategy. AMC policy letter [Appendix A] requires that justification and the estimated savings be included in the D&F. An appendix to this policy letter provides the guidance to prepare the MYP justification package. The guidance lists seven possible sources for cost savings. These are: inflation, vendor procurement, manufacturing, design engineering, tool design, support equipment and others. However, an analysis of the MYP justification packages for four representative MYP cases reveals that cost savings has accrued primarily due to the following three factors: inflation avoidance, vendor procurement and manufacturing. The magnitude of cost savings for these programs is shown in table 6. Table 7 lists each saving factor as a percent of the total savings. Even though each

program has listed the same three factors (inflation avoidance, vendor procurement and manufacturing), each factor exhibits a wide range of variation. Cost savings due to inflation avoidance, vendor procurement and manufacturing varies from 12.8% to 31.8%, 39.3% to 64.7% and 7.1% to 29.5% respectively. Due to large variations in each factor and the absence of a reasonably large data base, it is not feasible to assign numerical values to each factor.

Analysis of the MYP justification package reveals that there is no uniform source of savings for each factor. Each program has somewhat different reasons for the same savings factor.

TABLE 6. MYP COST SAVINGS

(In Millions)

Source of Savings		Programs			
		A	B	C	D
Inflation Avoidance		47.8	28.9	6.7	1.9
Vendor Procurement		60.4	66.1	15.4	9.0
Manufacturing		45.2	7.5	1.7	3.9
Design Engineering		--	--	--	--
Tool Design		--	--	--	--
Support Equipment		--	--	--	--
Others		--	--	--	--
Total		153.4	102.5	23.8	14.8
Total Estimated Contract Price	Annual	1,434.8	1,130.4	236.2	329.0
	Multiyear	1,281.4	1,027.9	212.4	314.2
% Cost Avoidance over annual contract		12	10	10.0	4.5
Proposed Period		FY 85-89	FY 85-87	FY 85-87	FY 83-85

TABLE 7. MYP COST SAVINGS

(As Percent of Total Savings)

Source of Savings	Programs			
	A	B	C	D
Inflation Avoidance	31.2	28.2	28.2	12.8
Vendor Procurement	39.3	64.5	64.7	60.8
Manufacturing	29.5	7.3	7.1	26.4
Design Engineering	--	--	--	--
Tool Design	--	--	--	--
Support Equipment	--	--	--	--
Others	--	--	--	--
TOTAL	100.0	100.0	100.0	100.0

The major explanations for cost savings due to inflation are that the contractor will produce or purchase the parts and materials for out years earlier, and contractors will purchase in economic lots. The explanations for cost savings due to vendor procurement are increased competition, economic production rates and economic lots. The explanations for cost savings due to manufacturing are (1) a decrease in the manufacturing labor due to the amortization of set-up times over larger production run, (2) a decrease in production man-hours will proportionately reduce the overhead,* (3) additional capital investment, (4) stable planning for the production process, (5) difficult scheduling and procurement of larger quantities.

It is clear that reasons such as, economic order quantity and advance procurement, are offered as explanations of cost savings due to inflation, vendor procurement and manufacturing. This shows that the variables are interdependent. Thus it can be difficult to categorize cost savings due to each factor separately.

D. RISK ANALYSIS.

Risk analysis is always performed with reference to a specific perspective from which the analyst views the outcome. Usually risk is compared to the benefits. In the case of MYP, the only quantifiable benefit is cost savings. There is a host of other unquantifiable benefits which may be more important than cost consideration. These include maintenance of strong industrial base, modernization of the industrial base and

*This reasoning is highly contested because contribution of production manhours to overhead costs may be small.

increased competition. Risk analysis for MYP should include the analysis of five risk factors delineated in the MYP Policy letter. These are: stability of requirement, stability of funding, stable configuration, degree of cost confidence and degree of confidence in contractor capability. Stability of design, requirement and funding is also a statutory requirement imposed by Public Law 97-86. It is clear that if a potential MYP system satisfies the statutory conditions and selection criteria are judiciously applied, than there is very low risk in MYP.

E. SUMMARY.

This research has found that learning curve and factor estimation techniques are being used within AMC to estimate savings due to MYP. The learning curve is not a suitable technique as it does not capture the savings due to vendor competition, vendor procurement, production efficiency, etc. which are characteristics of MYP. Factor estimation seems to be a viable technique. Three factors -- inflation avoidance, vendor procurement and manufacturing savings are commonly cited as sources of savings in MYP. Due to interdependence of variable, which contributes to these factors, a pattern cannot be discerned, and because of the lack of data base, a numerical value cannot be assigned to each factor. An analysis of the validity of each saving factor has been conducted and is presented in Chapter III.

CHAPTER III

FACTORS CONTRIBUTING TO MYP COST SAVINGS

A. INTRODUCTION.

Contract cost savings attributable to the use of a multiyear contract (MYC) are actually the direct result of one or more of three contractual characteristics that do not exist with single year contracts. The first characteristic is a long term contractual arrangement that can be made for up to five (5) years of military requirements. However, even with this long term arrangement, it is necessary that Congress appropriate yearly funds for the contract or it will automatically cancel. The second characteristic is related to cancellation. A contractor's non-recurring costs (NRC) for the MYC are normally amortized over the life of the contract. In the event a contract is cancelled before all NRC are amortized, the government will reimburse any unamortized portion of the NRC up to a maximum limit that is normally prenegotiated. This limit, or cancellation ceiling, will vary with different contracts. The final characteristic, although not always used since specific authorization is required, is the prime contractor's flexibility to manufacture and/or order components and material far in advance of the actual need.

Depending upon how the above MYC characteristics are applied and exploited, they may result in contract cost savings when compared to the alternative of a series of single year contracts. These potential cost savings are traceable to specific factor(s).

The purpose of this chapter is to identify and comment upon those factors most often thought to contribute to MYC cost savings.

B. REPRESENTATIONAL MYP ENVIRONMENT.

Before any savings factors can be discussed it must be remembered that this study's concern was noncompetitive major system acquisitions. When applying MYP techniques to such a system, at least one or two production runs must first be completed. A MYC is not normally applicable to a first production run of a major system. This is due to a statutory prerequisite for a MYC that requires "stability of design." Design stability cannot normally be achieved during a system development phase.

Because of the production experience in this representational MYP environment, it must be assumed that much (if not all) of the NRC associated with tooling, facilities, etc. had been incurred prior to the existence of a MYC.

Additionally, when estimating cost differences between a MYC and a series of single year contracts, continuity of production must be assumed to exist in either case. With some forethought, proper scheduling of production lots and deliveries with a series of single year contracts would allow the same continuity of production a MYC would guarantee, at least at the prime contractor system assembly level. Continuity at the subcontractor level is unlikely.

C. SAVINGS FACTORS.

After reviewing all the cost savings factors found during the research [Appendix B] it became clear that they all could be classified into one or more of five different major factors that are often cited as the factors that yield the most MYC cost savings. Those factors are briefly explained and their validity will be examined below.

1. Factor Listing.

a. Inflation Avoidance.

In its most simplistic form, this factor is meant to account for those savings that accrue from purchasing or manufacturing something now that will cost more later. This concept of savings does not withstand scrutiny because it does not account for the cost of lost opportunity (or the cost of borrowing) for the money spent now.

The concept of inflation avoidance is apparently rooted in the economic environment that existed in the United States in the latter part of the last decade. When the cost of borrowing was less than the expected rate of inflation for a given purchase (e.g. mortgage rates 8%, real estate increases 11% annually) one was able to avoid the full effect of inflation, hence the term inflation avoidance.

That type of economic environment does not exist today. Inflation expectations are reflected in interest rates and the current rates are greater than expected inflation. Six-month Treasury Bills are approximately 8% and expected inflation is less than 5%. If one was to make a purchase for the purpose of inflation avoidance, one would lose money, again, based upon economic expectations.

Even if the economic environment of the late seventies existed today, a military MYC would likely contain an Economic Price Adjustment (EPA) clause that would lessen or obliterate any inflation avoidance. The often discussed inflation avoidance savings factor does not offer any actual cost savings.

b. Administrative Savings.

The potential savings to be drawn from this factor are difficult to isolate. While it is true that a MYC eliminates the yearly necessity for repetitive administrative actions associated with proposal preparations, evaluation and negotiations, it is not clear if the total amount of contractor (and government) cost is reduced. If the manpower associated with the above administrative efforts is considered overhead and merely assigned other tasks, it is difficult to assume an actual cost savings due to the lower level of administrative effort.

For administrative savings to be attributable to a specific MYC, it is necessary that the contract have a lesser number of assigned administrative personnel (being directly charged to the contract) than would have been the case with a series of single year contracts. It is possible that repetitive yearly proposal/ negotiation related travel is a true savings factor; however, relative to the total cost of a major system MYC, these savings are small.

c. Capital Investment Savings.

If a contractor makes a capital investment (to reduce costs) and the total cost of production is reduced by more than the total cost of the capital investment, a capital investment savings is realized.

The greater quantities acquired under a MYC increase the opportunities for capital investment savings, but a case-by-case analysis is necessary to determine if a particular MYC presents these opportunities for savings. Predicting the potential for these savings requires product familiarity and knowledge of alternate methods of particular production processes.

Since the assumption has been made that most capital investment (at the prime level) has been made prior to the use of a MYC, the greatest realization of this savings factor would most likely occur at the subcontractor/vendor level.

d. Manufacturing Savings (Prime Contractor).

Because of the size, cost and complexity of a major system, there is little a prime contractor can do to accrue MYC based savings in the final assembly stages. It is just not feasible to manufacture and assemble a large number of major systems and inventory them until scheduled delivery dates arrive. However, those parts/components that the prime contractor chooses to make (rather than buy) are subject to the same potential savings discussed in the next section.

e. Vendor Procurement Savings.

Based upon literature reviews, field interviews and analysis, this factor provides the greatest opportunity for savings, but only when a prime contractor is authorized to make advance purchases of material and components. That authorization provides opportunity to maximize Economic Order Quantity (EOQ) savings, take advantage of quantity discounts and achieve other savings associated with the vendors having more flexibility in their production planning and scheduling.

2. Factor Summation.

The above factors are most often cited as theoretical sources of quantifiable cost savings. Research indicates that inflation avoidance does not truly contribute to MYP cost savings. Except in the most narrow circumstances, administrative savings are negligible. Capital investment

savings, if even applicable, are highly variable. The greatest potential for cost savings lies in advance manufacturing and advance purchasing of materials and components. However, without an advance procurement authorization, a MYC simply becomes a series of single year contracts without repetitive yearly administrative efforts.

Although the quantifiable savings potential of a non-competitive MYC is extremely limited when advance purchases are not authorized, there still is a MYP benefit due purely to expected program stability. Although not quantifiable, long term program stability is a true benefit. However, it is that stability plus the cancellation ceiling that offer the opportunity for capital investment and productivity improvement initiatives. A possible list of productivity improvement activities is listed below.

"1. Formal employee involvement in productivity improvement planning and evaluation (quality circles, suggestion programs, etc.)

2. Evaluating performance and establishing specific productivity improvement targets

3. Introduction or improvement of inventory control methods

4. Capital investment for new or automated machinery (not including robotics)

5. Introduction or expansion of use of robotics

6. Introduction or improvement of quality control methods, etc.

7. Systems innovations (integrated factories, advanced material handling techniques, computerized manufacturing methods, etc.)

8. Improvement of quality of product through worker training

9. Development of indirect labor standards and controls." [5]

An analysis of above mentioned activities shows that a quantitative estimate of savings that may accrue due to productivity improvement initiatives cannot be made without detailed data input from the contractor/subcontractor.

D. SUMMARY.

Administrative and capital investment savings factors are valid in narrow situations. Manufacturing and vendor procurement are valid savings factors, but only when advanced purchases are authorized. Stability, cancellation ceiling and capital investment together can provide incentive for productivity improvement initiatives. The cost reduction due to productivity improvement initiatives cannot be made without data input from the contractor/subcontractor.

Since quantifiable cost savings are almost solely attributable to advance manufacturing/purchasing, logic dictates that the higher the ratio of total subcontract (and in-house component manufacturing) cost to total contract costs, the greater the potential for MYP based savings. The actual amount of the savings attainable from advance manufacturing/purchasing depends upon a large number of variables that will be discussed in the next chapter.

CHAPTER IV

DIFFICULTIES IN ESTIMATING MYP COST SAVINGS

A. INTRODUCTION.

Trying to estimate the savings due to the use of a specific MYC is, at best, exceedingly difficult. Developing a standardized quantitative model for predicting MYP cost savings is even harder. This chapter explains the difficulties in both developing a model and estimating savings for an individual MYC.

B. QUANTITATIVE MODEL DEVELOPMENT.

1. Difficulties.

There are two major difficulties that are encountered when trying to develop a quantitative model to predict MYP cost savings. The first is the absence of a data base that reveals actual historical cost savings of a MYC vis-a-vis a series of single year contracts. The second major difficulty stems from the large number of variables that affect potential cost savings. Simply developing a list of the variables is quite a task; assigning those variables meaningful mathematical values is a virtual impossibility.

a. Data Base.

The absence of a data base reflecting actual MYP savings is due to the fact that no accurate method for verifying actual MYP savings has ever been developed. Actual cost savings are meant to be differentiated from estimated cost savings. Actual cost savings are the result of an after-the-fact analysis. Estimated cost savings are developed based upon

future expectations. Methods for estimating savings for MYP have been developed, but their common weaknesses are that they are non-standardized, highly subjective, relate savings to factors that do not truly yield savings (see Chapter III) and do not provide for adequate baselines for comparison purposes.

Based upon the research, the most commonly used (and discussed) method of estimating MYP based cost savings requires the contractor to prepare two cost proposals; one for a MYC and the other for a single year contract. Then, the price of the single year contract undergoes some adjustments based upon such factors as the number of years of the MYC, learning curve projections, estimated savings due to negotiations or any of a number of other factors that the developer/user of a particular method believes useful. The above adjustments to the single year proposal result in an estimated price thought to be the cost of a series of single year contracts. That adjusted, estimated price is then compared to the price of the MYC and any difference is considered the savings (or additional cost) due to use of a MYC.

Sometimes the comparison baselines used for MYP versus single year contract decisions are too fluid to result in supportable estimated savings projections. The negotiation factor is an example. At some point, a decision to use a MYC results in a negotiated price based upon a MYC cost proposal submitted by the contractor. The negotiated MYC price, usually agreed upon after protracted discussions between the government and the contractor, is normally different than the originally proposed price. The difference can be due to many reasons including errors in the proposal,

misunderstandings, oversight of potential efficiencies or even post-proposal changes to the scope of work. Comparing that negotiated MYC price to a price for a single year contract (that may or may not have been negotiated) that has undergone some adjustments does not provide a valid comparison on which to base estimated MYP cost savings. Moreover, the above comparison difficulties are compounded by the fact that a contractor can "game" his proposal to make his choice (MYC or single year contract) look more attractive.

The ideal method for a realistic comparison would entail having, concurrently, a MYC and a series of single year contracts for the same quantity of the same items with the same contractor in the same facilities. In that manner the comparisons would be based on almost identical situations with the one main variable being the procurement method. But, since there is no data base which includes any of the above comparisons, this report cannot make any quantitatively based statements relative to MYP cost savings whether actual or estimated.

b. Major Variables that Affect MYP Savings.

In the previous chapter, factors thought to affect MYP cost savings were discussed. It was concluded that only some of those factors offered any potential for valid cost savings. Of those factors that have a valid savings potential, it is necessary to perform a case-by-case analysis of specific MYP situations to determine which factors may be applicable.

Savings from the administrative and capital investment factors are applicable in the narrow situations discussed in the previous chapter

and require no other explanation. Savings from the Prime Manufacturing and Vendor Procurement factors are applicable when a MYC authorizes advance purchases. However, the research noted that not all materials and components are subject to savings if ordered in advance. One may not assume that purchasing a greater quantity of material/components leads to reduced unit costs. For those items having a limited shelf life, quantity purchases for future use may not yield savings due to spoilage. Some items may require costly maintenance while in storage. This maintenance may override any savings obtained from bulk purchases. Additionally, it would be risky to purchase and store a large quantity of components which could be subject to design modification. Also the cost of storage (warehousing) could outweigh a savings for a particular component. In sum, when the advance purchase technique is authorized it must be applied discriminately.

Some of the most salient reasons for the prime manufacturing and vendor procurement savings opportunities are discussed below. Those reasons can generally be considered the variables that most affect MYP cost savings. However, the greatest variable is the management ability and initiative of the prime contractor. Without an active program to maximize the MYP based savings, the opportunities to achieve savings from the following variables cannot be realized.

1. Make or Buy Decisions.

A greater quantity of components with a more compressed delivery/production schedule can impact the prime contractor's make or buy decision. Perhaps the greater quantity can be more economically produced by

a vendor than inhouse or vice versa. However, an estimate for this variable cannot be made without specific cost information relative to all the components affected by any changes in these decisions.

2. More Efficient Scheduling.

The main economic benefit of this variable is that components can be manufactured/fabricated using a flexible production schedule if the quantities and delivery schedules permit. Therefore, a manufacturer can more efficiently utilize idle production resources. A currently uncompleted MYP study has stated that this variable would allow a contractor to price his product at marginal cost rather than average cost. [15] An estimation of cost savings due to this variable requires data input from the contractor/subcontractor.

3. Greater Competition.

Larger quantities of a product can generate a greater interest among potential producers. With small quantities, startup costs may be too great to allow new producers to enter a given product field. The larger quantities inherent in the MYP advance purchase characteristic allow startup cost to be spread over more units. This permits the entry of more potential producers which increases competition. Even though this variable may result in reduced unit prices, the likelihood of being able to accurately estimate the actual savings for a given acquisition is very low.

4. Effect on Business Base.

The effect of a large order on a vendor's business base may result in savings. If the business base undergoes a great expansion due to a

large order(s) there will be more units to absorb overhead costs and the unit prices may decrease (depending upon the increase in total overhead due to the large order(s)). However, a seemingly large order may have such an insignificant effect on a base that no savings are realized. Estimating the monetary impact of this variable on a specific MYC would be difficult.

5. Economic Environment.

The economic health of the country, a particular industry and a specific company may have an effect on cost savings. In a booming economy, an industry or a company may not be very aggressive in seeking additional work unless it presents an opportunity to receive premium profits. Conversely, in troubled economic times characterized by excess capacities, a manufacturer may be willing to provide supplies and services at a price closer to his variable cost, perhaps even absorbing a loss to keep his work force in place and his facilities operating. Predicting the applicability of this variable is much easier than predicting the actual amount of savings or increased cost.

6. Economic Order Quantities (EOQ).

Under an MYC, advance procurement authorization permits savings through EOQ. EOQ is defined as the optimal quantity of materials and/or components to order periodically in terms of demand (production need), cost to hold (cost of maintaining inventory), and cost of reordering. [16] A great deal of detailed product and production knowledge would be necessary before one could estimate the savings due to this variable.

C. SUMMARY.

There is no reliable historical data that reveals the actual cost savings

due to the use of a MYC. Additionally, such historical data can never be reasonably developed. Because of this there has never been verification that MYP has actually resulted in less cost than would have been the case with a series of single year contracts.

All estimates of potential savings from a particular MYC have been based upon highly subjective inputs. Many times these inputs did not properly consider the applicability of either the factors cited in the last chapter or the variables cited in this chapter.

The current methods for projecting MYP cost savings cannot result in reliable estimates. At present, a general quantitative method to accurately estimate MYP savings cannot be developed. Efforts to estimate potential MYP savings should focus on an analysis of the appropriate factors discussed in Chapter III.

CHAPTER V

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

A. FINDINGS.

MYP strategy provides opportunities for program stability, production continuity, risk coverage and use of EOQ. [Chapter II] These characteristics can lead to capital investment for productivity improvement, and cost reduction. Cost savings can accrue but research has found no universal methodology for predicting the cost savings. Two techniques, learning curve and factor estimation, are being used, but both have shortcomings. Learning curve is ineffective as it only captures the benefits due to production continuity and for major systems production continuity can be achieved even under annual year contracts. Factor estimation, offers some hope for capturing MYP savings. An analysis of the potential saving factors under this technique reveals five major saving factors. They are: inflation avoidance, administrative savings, capital investment, vendor procurement and manufacturing. An analysis of each factor showed that inflation avoidance is not a viable factor. Capital investment and administrative savings provide only slight promise. Vendor procurement and manufacturing is the chief source of cost savings but only when advanced purchases are authorized. [Chapter III] Efforts have been directed to formulate a procedure to quantify savings due to manufacturing and vendor procurement. Six different variables are identified as potential contributors to the savings from manufacturing and vendor procurement. These are: make or buy decision, efficient scheduling, greater competition,

effects on business base, economic environment, and EOQ. Savings due to make or buy decisions, greater competition, and economic environment are difficult to predict and quantify. Savings due to efficient scheduling, effect on business base, and EOQ require substantial data input from the contractor. [Chapter IV] This data is not readily available. Expending resources to generate such a data for the particular system under consideration for MYP may not be feasible. Even if feasible, the validity of the data cannot be accepted without risk.

B. CONCLUSIONS.

The need to synthesize the old and new techniques or factors to estimate MYP cost savings into a comprehensive model is clear. But this research has established that a reliable and verifiable quantification of the variables which contribute to MYP cost saving is not feasible. However, it has been observed that factor estimation is the only viable methodology for estimating MYP cost savings and the most promising factors are manufacturing and vendor procurement. The variables which contribute to these factors have been identified.

C. RECOMMENDATIONS.

It is recommended that the factor estimation technique be used to estimate MYP cost savings and emphasis be placed on the savings from manufacturing and vendor procurement.

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DEPARTMENT OF THE ARMY
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DRCPP-S

30 SEP 1982

SUBJECT: Policy Letter for Determining and Reporting Calculation of Multiyear Contracting Savings

SEE DISTRIBUTION

1. Reference:

a. Acquisition Letter 82-7, 30 March 1982, paragraph a, "New DAR Coverage on Expanded Multiyear Procurement."

b. Message, HQDA, 29 April 1982, subject: Acquisition Letter 82-8, Delegation of Multiyear Procurement Authority 1-322.1(c).

c. Deputy Secretary of Defense Memo, 1 May 1981, subject: Policy Memorandum on Multiyear Procurement.

2. Purpose:

To establish a common basis for reporting and calculating multiyear contract savings and to provide common definitions and terms used in describing savings.

3. Basis:

A major factor in the decision to contract on a multiyear basis is the magnitude of savings resulting from this strategy. DAR 1-322 states that multiyear contracting must result in reduced total costs under the contract. Public Law 97-86 requires that a Determination and Findings be made by the Secretary to this effect.

4. Responsibility:

It shall be the responsibility of the contracting officer in conjunction with the Program (Acquisition) Manager to assure that the D&F includes the justification and the estimated savings in support of the request for a multiyear contract.

5. Methods for Determining Savings:

a. Budget:

The program budget estimate developed in justifying the Five Year Defense Plan and budget submission to Congress shall be used to establish a

multiyear baseline in support of the multiyear Determination and Findings as required in DAR 1-322 and Acquisition Letter 82-8. Inclosure 1 (Exhibits 1 through 8) contains the OSD prescribed submission formats for multiyear savings analysis. These formats shall be included in the justification for Determination and Findings for all multiyear contracts where appropriate.

b. Contracts:

(1) A side by side comparison of the price for a multiyear contract as compared with prices for a series of annual contracts for the same item is the preferred method of determining multiyear savings. It is recognized that early in the program/budget cycle actual contractor proposed prices will not be available for comparison to the cost estimate for the planned multiyear buy. Therefore, contract savings must be based on Government estimates of the cost of a multiyear strategy versus the cost of an annual and/or other strategies. All rationale and methodology used in developing this estimate must be documented and shall be thoroughly supportable. These estimates, and type contract, must be consistent with the POM and budget submissions and be reflected in the acquisition plan. All rationale and methodology used in developing the estimate must be documented and all allowable savings must be included. (See "allowable savings", Inclosure 3).

(2) A copy of all final multiyear contract cost savings, with appropriate copies of the exhibits showing the cost savings based on the budget estimate versus the final contract price will be forwarded to HQ DARCOM, ATTN: DRCPP-SP, 10 days after award of the multiyear contract.

c. Realized Savings Discrepancies:

A comparison of the savings estimates used in justifying the use of multiyear contracting approach and the final negotiated or bid contract savings shall be accomplished. If the final negotiated or bid contract savings is 10% lower than the estimated budget savings, an impact statement, along with appropriately revised exhibits (Inclosure 1) shall be forwarded to HQ DARCOM, ATTN: DRCPP, for review and approval prior to award of the multiyear contract.

d. Other:

Contracts may be entered into where the contract savings equals zero if other allowable savings, and total benefits to the Government can be sufficiently supported. Factors such as standardization, reduction of administrative burden and program stability may weigh heavily in the consideration of multiyear contracting strategy. A careful review of the acquisition strategy where zero contract savings exists should be conducted to provide a foundation and justification for pursuing this strategy. Consideration should be given to the reasons why an annual contracts approach is inadequate in these cases.

DRCPP-S
SUBJECT: Policy Letter for Determining and Reporting Calculation of Multiyear Contracting Savings

6. Additional Total Obligational Authority:

a. Where opportunities to reduce total costs under the contract can be capitalized on by a shift of Total Obligational Authority to earlier years in the advance procurement line, consideration must be given to the cost of money as applied to the earlier expenditure of funds on the multiyear contract versus annually funded contracts. In addition, costs of storage, maintenance and other costs associated with earlier production and delivery should be presented. It is recognized that these costs may not be easily computed but may dramatically affect the decision to fund this expanded advance procurement of out year materials.

b. Full evaluation of savings that are based on the current fiscal year constant dollar value and discounted in accordance with the procedures and indicies, as prescribed in DODI 7041.3, dated 18 October 1972, shall be accomplished and provided in the Determination and Findings submission.

7. Inclosure 2 provides examples of the use of the budget and contract savings in multiyear contracting.

8. Inclosure 3 provides the definitions and terms used for describing multiyear contract savings.

FOR THE COMMANDER:

3 Incl
as

ROBERT L. HERRIFORD, SR.
Major General, USA
Director of Procurement
and Production

DISTRIBUTION:
B

MULTIYEAR PROCUREMENT CRITERIA

Program _____

(Brief statement describing the multiyear procurement, i.e., this multiyear procurement will procure "x" number of units over "X" number of fiscal years by using one or more multiyear contracts.)

CRITERIA

The process of deciding to use or not to use a multiyear procurement (MYP) for production programs as well as how best to tailor and structure MYP requires management judgment. The following criteria have been prepared as guidelines for decision makers. The criteria are to be considered in a comparative benefit/risk analysis format where criterion 1 below, represents the benefit factor and criteria 2 through 6 represent risk factors.

1. Benefit to the Government. A multiyear procurement should yield substantial cost avoidance or other benefits when compared to conventional annual contracting methods. MYP structures with greater risk to the Government should demonstrate increased cost avoidance or other benefits over those with lower risk. Savings can be defined as significant either in terms of dollars or percentage of total cost.

2. Stability of Requirement. The minimum need (e.g., inventory or acquisition objective) for the production item or service is expected to remain unchanged or vary only slightly during the contemplated contract period in terms of production rate, fiscal year phasing, and total quantities.

3. Stability of Funding. There should be reasonable expectation that the program is likely to be funded at the required level throughout the contract period.

4. Stable Configuration. The item should be technically mature, have completed RDT&E (including development testing or equivalent) with relatively few changes in item design anticipated and underlying technology should be stable. This does not mean that changes will not occur but that the estimated cost of such changes is not anticipated to drive total costs beyond the proposed funding profile.

5. Degree of Cost Confidence. There should be a reasonable assurance that cost estimates for both contract costs and anticipated cost avoidance are realistic. Estimates should be based on prior cost history for the same or similar items or proven cost estimating techniques.

6. Degree of Confidence in Contractor Capability. There should be confidence that the potential contractor(s) can perform adequately, both in terms of Government furnished items (material, data, etc.) and their firm's capabilities. Potential contractors need not necessarily have previously produced the item.

ACQUISITION STRATEGY COMPARATIVE SUMMARY
($ in Millions)

Program _____

	ANNUAL CONTRS	MYP ALTERNATE
NR UNITS		
TOTAL CONTRACT PRICE		
CANCELLATION CEILING		
$ COST AVOIDANCE OVER ANNUAL		
% COST AVOIDANCE OVER ANNUAL		
RISK RELATED FACTORS *		
- REQUIREMENT STABILITY		
- FUNDING STABILITY		
- CONFIG STABILITY		
- COST CONFIDENCE		

A separate chart will be prepared for each multiyear contract included in the line item.

* EACH RISK FACTOR SHOULD BE CATEGORIZED AS LOW, MEDIUM OR HIGH ON THIS LINE IN THE MULTIYEAR ALTERNATIVE COLUMN. AN EXPLANATION OF THE RISK ASSESSMENT FOR EACH FACTOR IS INCLUDED IN THE EXHIBIT WHICH ADDRESSES THE MULTIYEAR PROCUREMENT CRITERIA.

TOTAL PROGRAM FUNDING PLAN

Program _____

	FY	FY	FY	FY	FY	TOTAL
Quantity						
Annual Program						
End Item						
Less Advance Funding						
Net Request						
Advance Funding						
Total Budget Request						
Multiyear Program						
End Item						
Less Advance Funding						
Net Request						
Advance Funding						
(For FY)						
(For FY)						
(For FY)						
(For FY)						
Total						
Total Multiyear Cost						
TOA Difference						

This chart will compare the funding for the annual proposal and the multiyear proposal.

Outlays	FY	FY	FY	FY	FY	FY	FY	FY	FY	TOTAL
Annual										
Multiyear										
Difference										

CONTRACT FUNDING PLAN

Program _____

	FY	FY	FY	FY	FY	TOTAL
Quantity						
Annual Proposal						
Gross						
Less A.P.						
Net						
Advance Procurement						
TOTAL ANNUAL COST						
Multiyear Proposal						
Gross						
Less A.P.						
Net						
Advance Procurement						
For 1984						
For 1985						
For 1986						
For 1987						
TOTAL						
TOTAL MULTIYEAR COST						
TOA Difference						

This chart will compare the funding for the annual proposal and the multiyear proposal. The total TOA difference on this chart will agree with the "Cost Avoidance over Annual" line on Exhibit 2 for each MY contract.

Outlays	FY	FY	FY	FY	FY	FY	FY	FY	FY	TOTAL
Annual										
Multiyear										
Difference										

IMPACT OF INFLATION ON FUNDING

	TOA ($ in Millions)						
	FY	FY	FY	FY	FY	FY	TOTAL
MULTIYEAR PLAN							
Contract							
+2%							
+1%							
Budget							
-1%							
-2%							
Total Program							
+2%							
+1%							
Budget							
-2%							
-1%							
ANNUAL PLAN							
Contract							
+2%							
+1%							
Budget							
-1%							
-2%							
Total Program							
+2%							
+1%							
Budget							
-1%							
-2%							

The TOA required annually for the multiyear contract and the total program will be presented on the exhibit. This exhibit will identify the change in the total program and contract plans as a result of a change of 1% per year or 2% per year in the approved inflation rate.

SAVINGS AND COST AVOIDANCE

	FY ___	FY ___	FY ___	FY ___	FY ___	TOTAL
QTY						
Annual Contract	(The number of years on the exhibit will depend on the length of the multiyear contract.)					
Multiyear Contract	The amounts under each fiscal year will be the gross cost or total cost of the number of units in that fiscal year.					
Difference						

Source of Savings	($ in Millions)
Inflation	
Vendor Procurement	
Manufacturing	
Design/Engineering	
Tool Design	
Support Equipment	
Other	
TOTAL	

A paragraph of explanation is required for each category of savings.

10

IMPACT OF DEFENSE INDUSTRIAL BASE OF THE MULTIYEAR PROGRAM

The following topics should be separately discussed for the prime contractor and for the vendors/subcontractors of the multiyear contractor:

Improved Competition
Enhanced Investment
Improvement in Vendor Skill Levels
Training Program
Progress Payment Changes
Use of Multiyear Contractors (vendors)
Increased Production Capacity

PRESENT VALUE ANALYSIS

Program _____

	Outlays				
F[illegible]	FY	FY	FY	FY	TOTAL

Annual Proposal
- Then Year Dollars
- Constant Dollars
- Present Value

Multiyear Proposal
- Then Year Dollars
- Constant Dollars
- Present Value

Difference
- Then Year Dollars
- Constant Dollars
- Present Value

- This exhibit will be prepared for the contract values. "Then year dollar" totals will agree with the outlay and total TOA amounts contained on MYP Exhibit 4.

- Constant dollars will be expressed in the year of the current budget unless specified otherwise in the memorandum requesting submission of the budget.

- Present value analysis will be calculated in accordance with DoD Instruction 7041.3.

12.

Example 1

"Budget savings" must be differentiated from "contract savings". Budget savings result when the final contract is lower than that budgeted for the end item. Contract savings result when a multiyear contract proposal is lower than an annual proposal. Contract savings may occur even if budget savings are zero. That occurs when the final multiyear contract is equal to or greater than the amount budgeted for that item. Contract savings may still exist as shown in this example.

SAMPLE 1:	FY-1	FY-2	FY-3
POM $ =	100 Mil	100 Mil	100 Mil
MY Prop.$ =	100 Mil	100 Mil	100 Mil
Annual .$ =	110 Mil	110 Mil	115 Mil

Budget savings = $0
Contract savings = $35 Mil

SAMPLE 2:	FY-1	FY-2	FY-3
POM $ =	100 Mil	100 Mil	100 Mil
MY Prop.$ =	90 Mil	90 Mil	90 Mil
Annual .$ =	100 Mil	100 Mil	100 Mil

Budget savings = $30 Mil
Contract savings = $30 Mil

EXAMPLE 2

Where savings are generated from the shift of TOA and the earlier expenditure of funds, savings should reflect the additional potential costs of money resulting from this shift. Because the percentage cost of money significantly affects the outcome of savings, a sensitivity analysis should reflect various percentages to better assess the real impact of the cost of money.

SAMPLE 3:	FY-1	FY-2	FY-3	TOTAL
POM $ =	100 Mil	100 Mil	100 Mil	300 Mil
MY Prop.$ =	110 Mil	90 Mil	80 Mil	280 Mil
Annual .$ =	100 Mil	100 Mil	100 Mil	300 Mil

Budget savings = $20 Mil
Contract savings = $20 Mil

HOWEVER: ANY INCREASED EXPENDITURES RESULTING FROM INCREASED TOA IN FIRST YEAR OF $10 MIL SHOULD BE DISCOUNTED TO REFLECT COST OF MONEY.

DEFINITIONS

Contract Savings: The difference between the final negotiated or bid multiyear contract proposal price and the annual contract proposal price.

Budget Savings: The difference between the final negotiated or bid multiyear contract price and the government estimate of the cost to complete the line item as presented in the budget.

Allowable Savings (Both Annual & Multiyear proposals received): Those savings in addition to contract savings that may be presented in support of a multiyear contracting strategy. These savings may include:

a. Standardization savings---Those potential savings resulting from having only one type or design end item in the inventory. Training costs, stockage and storage costs, administrative overhead, and any other cost realized through standardization are included in this category.

b. Administration Burden---Those savings identified as related to a reduction of the administrative burden in placement and administration of contracts.

c. Quality Control---Those savings identified as resulting from the elimination of the need of establishing and "proving out" quality control techniques and procedures for a new contract for each year.

NOTE: Competition---Where multiyear contracting makes solicitation on a competitive basis possible, full contract savings shall be attributed to multiyear contracting.

Allowable Savings: (Only Multiyear Contracting proposals received) Where only a multiyear proposal was solicited the following savings estimates are allowable.

a. Differences in cost over a previously purchased item.

b. Standardization savings as where both proposals are received.

c. Reduction of administrative burden in the placement and administration of contracts.

Discounted Savings: Savings adjusted to reflect the impact of discounting on the absolute numbers presented on the annual and multiyear proposals.

Discount Factor: That percentage used to discount savings.

NOTE: Refer to definitions listed in referenced 1 May 1981 Memorandum on Multiyear Contracting. (Attachment A)

Encl 3

DEFINITIONS

Advance Procurement. An exception to the full funding policy which allows procurement of long leadtime items (advanced long lead procurement) or economic order quantities of items (advance EOQ procurement) in a fiscal year in advance of that in which the related end item is to be acquired. Advance procurements may include materials, parts and components as well as costs associated with the further processing of those materials, parts and components.

Annual Funding. The current Congressional practice of limiting authorizations and appropriations to one fiscal year at a time. The term should not be confused with two year or three year funds which permit the Executive Branch more than one year to obligate the funds.

Block Buy. Buying more than one year's requirement under a single year's contract. A total quantity is contracted for in the first contract year. Block buys may be funded to the termination liability or fully funded.

Cancellation. A term unique to multiyear contracts. The unilateral right of the Government not to continue contract performance for subsequent fiscal years' requirements. Cancellation is effective only upon the failure of the Government to fund successive FY requirements under the contract. It is not the same as termination.

Cancellation Ceiling. Upon cancellation, the maximum amount that the Government will pay the contractor which the contractor would have recovered as a part of the unit price, had the contract been completed. The amount which is actually paid to the contractor upon settlement for unrecovered costs (which can only be equal to or less than the ceiling) is referred to as the cancellation charge. Currently, this ceiling includes only nonrecurring costs.

Full Funding. Funds are available at the time of award to cover the total estimated cost to deliver a given quantity of complete, militarily useable end items or services. Under current policy (DOD Directive 7200.4), the entire funding needs of the fiscal year production quantity must be provided unless an exception for advance procurement has been approved. A test of full funding is to ask the question, Does any part of this year's buy depend on a future year appropriation to result in the delivery of complete units? If the answer is yes, the contract is probably not fully funded. The principle of full funding applies only to the Procurement Title of the annual appropriation act and therefore affects production contracts but not RDT&E contracts.

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Incremental Funding. Funds are not available at the time of contract award to complete a fiscal year's quantity of end items in a finished, military useable form. Future year appropriations are required in order to complete the items or tasks. Incremental funding is commonly used for RDT&E programs.

Multiyear Contract. A contract covering more than one year's but not in excess of five year's requirements. Total contract quantities and annual quantities are planned for a particular level and type of funding as displayed in the current FYDP. Each program year is annually budgeted and funded and, at the time of award, funds need only to have been appropriated for the first year. The contractor is protected against loss resulting from cancellation by contract provisions which allow reimbursement of costs included in the cancellation ceiling.

Multiyear Funding. A Congressional authorization and appropriation covering more than one fiscal year. The term should not be confused with two year or three year funds which cover only a one fiscal year's requirement but permit the Executive Branch more than one year to obligate the funds.

Multiyear Procurement. A generic term describing situations in which the Government contracts, to some degree, for more than the current year requirement. Examples include multiyear contracts, block buys, advance EOQ procurement. Generally, advance long lead procurements in support of a single year's requirement would not be considered a multiyear procurement.

Nonrecurring Costs. Those production costs which are generally incurred on a one time basis include such costs as plant or equipment relocation; plant rearrangement; special tooling and special test equipment; preproduction engineering; initial spoilage and rework; and specialized work force training.

Recurring Costs. Production costs that vary with the quantity being produced such as labor and materials.

Termination for Convenience. Procedure which any apply to any Government contract, including multiyear contracts. As contrasted with cancellation, termination can be effected at any time during the life of the contract (cancellation is commonly effected between fiscal years) and can be for the total quantity or a partial quantity (whereas cancellation must be for all subsequent fiscal year's quantities).

Termination Liability. The maximum cost the Government would incure if a contract is terminated. In the case of a multiyear contract terminated before completion of the current fiscal year's deliveries, termination liability would include an amount for both current year termination charges and outyear cancellation charges.

Termination Liability Funding. Obligating sufficient contract funds to cover the contractor's expenditures plus termination liability but not the total cost of the completed end items.

APPENDIX B

CONSOLIDATED LIST OF POTENTIAL SAVINGS FACTORS

1. PROGRAM STABILITY SAVINGS.

   a. Enhanced Planning
   b. Efficient Scheduling
   c. Steady Production Rates

      (1) Efficient Production Controls
      (2) Efficient Use of Special Tooling
      (3) Elimination or Reduction of Stretchout Costs

   d. Optimal Plant Layout
   e. Efficient Use of Fixed Capacity Costs

      (1) Optimal Use of Facilities
      (2) Reduced Allocations

   f. Reductions in Overhead Pools

2. VENDOR PROCUREMENT SAVINGS.

   a. Enhanced Vendor Competition

      (1) Qualitative
      (2) Quantitative

   b. Advance Procurement Savings

      (1) EOQ Savings
      (2) Quantity Discounts
      (3) Inflation Avoidance
      (4) Stockpiling

   c. Level Procurement Savings

      (1) Multiyear Subcontracts
      (2) Long-Term Vendor Commitments
      (3) Optimum Vendor Production Rates
      (4) Vendor Manufacturing Savings

   d. Risk Transfer

      (1) Prime Contractor Termination Liability Assumption
      (2) Subcontractor Termination Liability Assumption

3. MANUFACTURING SAVINGS.

a. Labor Efficiency

(1) Productivity Improvements
(2) Avoidance of Overtime and Shift Premiums

b. Labor Learning or Improvement

(1) Longer Production Runs
(2) Retention of Trained Manpower
(3) Use of High Technology Equipment
(4) Reduced Disruptions
(5) Absolute Learning Rate Improvements (Rotation)

c. Labor Continuity

(1) Reduced Recruitment Costs
(2) Reduced Training Costs
(3) Reduced Termination Costs

d. Inflation Avoidance from Advance Manufacturing

4. NONRECURRING COST SAVINGS.

a. NRC Ammortization
b. Continuity Savings

(1) Repetitive Startup Cost Avoidance
(2) Repetitive Phaseout Cost Avoidance

5. ADMINISTRATIVE SAVINGS.

a. Government

(1) Contract Placement Cost Avoidance
(2) Contract Management Cost Avoidance

b. Prime Contractor/Subcontractors

(1) Bid and Proposal Cost Avoidance
(2) Subcontract Placement Cost Avoidance
(3) Subcontract Management Cost Avoidance

6. OTHER SOURCES OF SAVINGS.

a. Concurrent Spares Ordering
b. Support Equipment Savings
c. Capital Acquisition Savings
d. Industry Training Programs

e. Progress Payment Changes
f. Increased Production Capacity
g. Design/Engineering Savings
h. Tool Design Savings

7. OFFSETTING FACTORS.

a. Borrowing Costs
b. Storage Costs
c. Lost Opportunity Costs
d. Capital Investments

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It is the common consensus that multiyear contracting is not a panacea for the defense acquisition system but it can be an effective way to reduce acquisition costs if applied with discretion. The primary challenge to those employing the multiyear strategy is to demonstrate the cost reduction vis-a-vis annual contracts. This study analyses the characteristics peculiar to multiyear contracting and the ensuing factors contributing to cost savings. The possible saving sources are identified and their applicability is analyzed.

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